2016 Forest Management Summary Report

City of Boulder Open Space and Mountain Parks
and
City of Boulder Fire Department

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February 2017

Cover photos
Top: Tyler Wurzer of the OSMP forest crew cuts trees as part of the Betasso thinning project.
Middle: An OSMP forest crew member works the Mount Pleasant Fire in Virginia in November, 2016
Bottom: A partially treated area in the Spring Brook thinning project.

EXECUTIVE SUMMARY

The 2016 field season was the thirteenth consecutive year Open Space and Mountain Parks (OSMP) committed full time resources to the implementation of the Forest Ecosystem Management Plan (FEMP). In total, 191 10-hour days were spent on forest management by the OSMP forest restoration crew between March 14 and December 22. As a result of these efforts, 145 forest acres were thinned in 2016. The field season also included a continued emphasis on vegetation monitoring, mapping and analysis, and collaborative projects with neighbors, local fire protection districts and the Colorado State Forest Service.

BACKGROUND

In June of 1999, Boulder City Council approved the City of Boulder Forest Ecosystem Management Plan (FEMP). The plan established a framework, policy guidelines, and management direction for forest ecosystem management on city lands. The FEMP focuses on two primary goals:

- Maintain or enhance native plant and animal species, their communities and the ecological processes that sustain them
- Reduce the wildfire risk to forest and human communities

FOREST MANAGEMENT PROGRESS

Since the adoption of the Forest Ecosystem Management Plan in 1999 implementation has evolved and adapted over the years. Acres treated is often an incomplete measure of success because there is a wide variation in tree density and slope from project to project but it can provide a sense for how much progress is being made towards forest management goals. Since the adoption of the plan, approximately 75% of the projects outlined in FEMP have been completed and an additional 300+ acres have been treated in projects that were developed after the original plan. In recent years, OSMP has maintained a steady completion rate for forest management (Figure 1).

Prior to 2004, OSMP relied on a mix of staff including rangers and fire department staff to complete FEMP projects. In 2004 a seasonal crew of four was hired specifically dedicated to OSMP forest management projects and in 2013 the crew was increased to eight seasonal staff. OSMP also hired a standard Forest Management Technician in 2013 to manage many of the field operations of the crews. OSMP has also increased forestry dedicated equipment to two tractors and two large capacity chippers to complete FEMP related work. The staff time and efforts dedicated to forest management on OSMP during the 2016 season is outlined in this annual report.

In addition to internal staff, OSMP has been able to extend its effectiveness by working collaboratively with other local groups with similar goals. In 2005, OSMP and the Wildland Division of the City Fire Department developed the first Service Level Agreement (SLA) to define the annual work plan for both crews. Crew coordination and a strong working relationship with City Fire has continued through 2016. OSMP staff has also partnered with local fire protection

districts, Colorado State Forest Service, and Boulder County to complete larger scale forest management projects in the past few years. In addition to collaborative projects, OSMP has been able to secure a number of grants to implement OSMP forestry work. Over the past eight years, OSMP has benefited from over $275,000 in state and federal grants administered by the Colorado State Forest Service. This money has helped extend seasons and increased the amount of work completed.

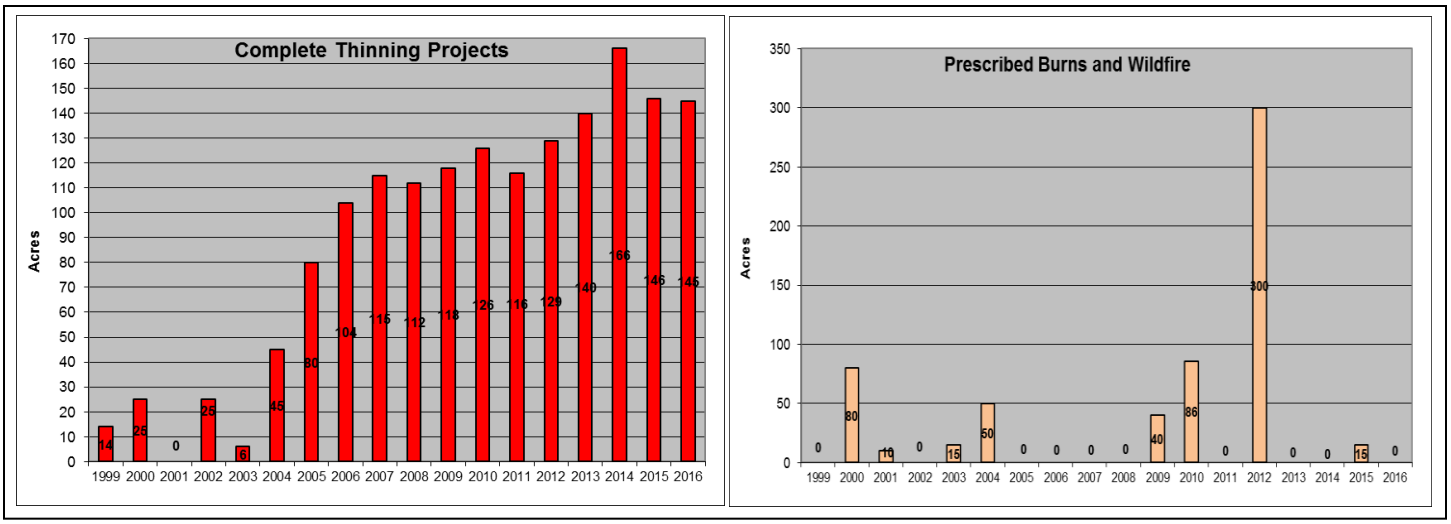


Figure 1: Annual forest management progress on OSMP

2016 FOREST MANAGEMENT CREW

Most of the implementation of the Forest Ecosystem Management Plan is carried out by a highly skilled, dedicated, and hardworking seasonal crew. During the 2016 season OSMP hired a forest crew of seven for a total of nine and a half months. The crew spent 191 work days (up from 174 work days in 2015) on various OSMP projects with most of the emphasis on forest thinning (Figure 2). The forest crew also spent time on other departmental priorities including hazard tree removals and training other staff.

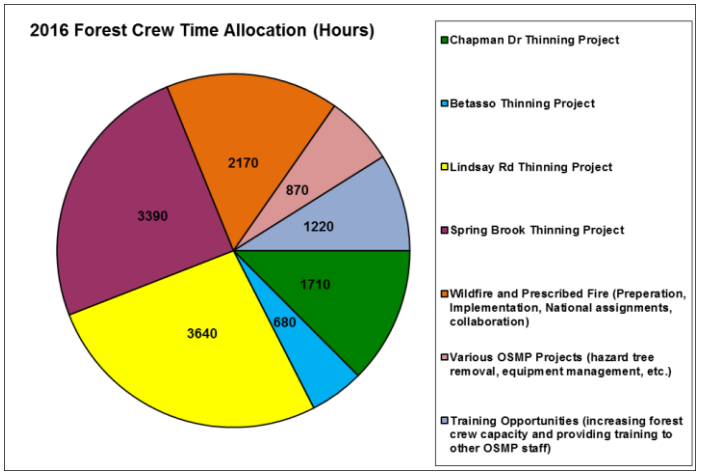


Figure 2: Time spent on 2016 projects by the OSMP forest crew.

In addition to the forest management work completed by OSMP staff, The Fire Department's Wildland Division (Fire) worked closely with OSMP staff to meet the goals of the FEMP. In 2016, OSMP and Fire worked to plan and implement a prescribed burn in the Shanahan Ridge area. The burn wasn't fully completed due to weather and fuel conditions but collaborative efforts will continue with the goal of completing the burn in 2017. Fire staff also worked with OSMP to expand and enhance wildfire training through national wildfire assignments. Fire staff connected OSMP staff with local interagency fire crews that responded to large wildfire incidents across the country. A total of six OSMP forest crew members were dispatched on assignments in Yellowstone NP, northern Wyoming, and Virginia throughout the 2016 season.

Only one or two staff members were out at a given time so OSMP project work was not significantly impacted. These assignments provide an invaluable learning experience for OSMP staff that strengthen the departments overall firefighting capacity and all staff expenses associated with the assignments are reimbursed back to the City.

2016 FOREST MANAGEMENT PROJECTS

Over 9000 person hours were spent by the OSMP forestry crew on thinning projects in 2016. The project locations in 2016 required crews to move across projects throughout the season as weather and access allowed but in most cases all seven staff members worked as a single unit. Twelve days (down slightly from 19 in 2015) were spent working with volunteer groups, OSMP Junior Rangers and jail crews. Each group included 8 to 12 individuals who helped complete some of the most difficult forest management work including chipping, dragging slash, and loading smaller logs.

Chapman Drive Thinning Project

The Chapman Drive thinning project was started in 2015 and carried over into the 2016 season. The project was part of a 2014 State Fire Assistance Grant and was awarded $79,500 in grant funds. The goal of the project was to complete 75 acres of thinning in the 2.5-mile area along Chapman Drive between Flagstaff Road and Boulder Canyon. The thinning work was a priority for OSMP but it was also identified in both the Boulder County and Rocky Mountain Fire Community Wildfire Protection Plans as a high priority project, primarily for its value as a landscape scale fuel break and an emergency egress route. The treatment also expanded on previous work done along Flagstaff Road and near the Flagstaff summit to create a more fire resistant landscape and improve important evacuation routes in the area.

The completed Chapman Dr. project covered a total of 83 acres. During the two-year duration 9547 person-hours were spent on the project and 1710 hours were dedicated to the project in 2016. All of the work was done in-house by OSMP staff and involved cutting, chipping, skidding, and hauling to complete the project. Thinning in the project focused on removing small and medium diameter trees in the understory of the larger trees and decreasing the heavy ladder fuels along the road. Cutting and skidding extended 50 to 200 feet from both sides of the road.

Removals focused on trees in the 2” to 8” diameter classes and decreased the overall basal area by about 25% from 90 sq. ft./acre to 70 sq. ft./acre. The canopy base height increased from an average of 2-3 feet to 10-15 feet, making the area more resistant to a running canopy fire (figure 3).

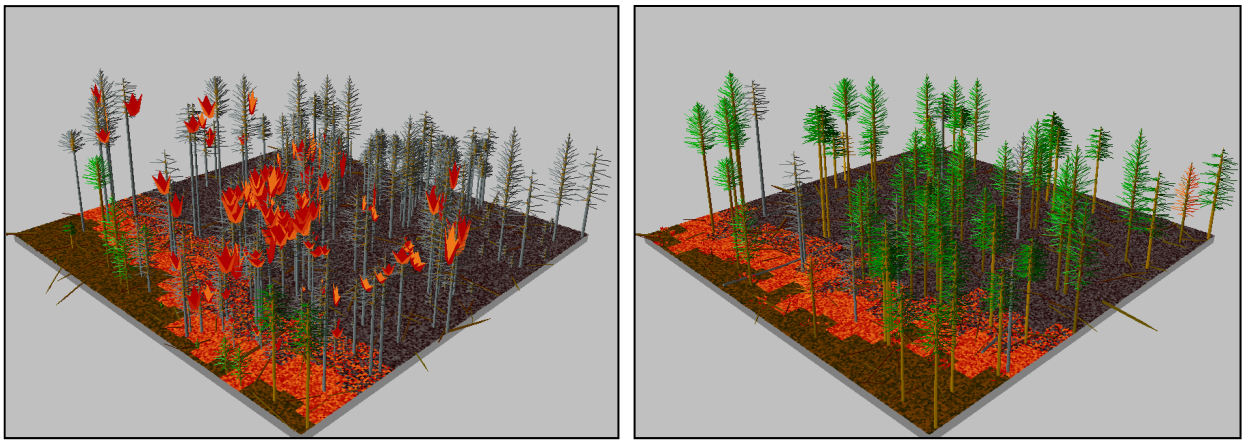


Figure 3: Modeled fire behavior in the Chapman Drive project area. The picture on the left shows pre-thinning conditions and the one on the right shows post-thinning with 25% of the basal area removed. Both were “burned” with identical model inputs that closely matched the weather and fuel conditions during the Fourmile Canyon Fire. The Chapman Drive thinning project changed the modeled fire behavior from a running canopy fire to a fire that primarily stays on the ground.

Lindsay Road (CR67) Thinning Project

Both the Lindsay Rd. project and the Spring Brook project described below were identified by OSMP and Colorado State Forest Service staff as an opportunity to partner on State Fire Assistance Grant funds in 2016. Grant funds in the amount of $34,200 were provided by the State to complete both these projects during the season.

This thinning project started on April 4 and work was completed on July 25, 2016. The Lindsay Rd. treatment unit covered a total of 20 acres of OSMP land along county road 67 just south of Eldorado Springs. The area is immediately adjacent to private property and the Eldorado Mountain Yoga Ashram. The treatment built on a number of adjacent previous forest management projects including a 2004 prescribed fire.

Due to its close proximity to homes and private property, this project focused on decreasing wildfire risk. Treatment in this stand targeted dense patches of small to medium diameter trees and focused on areas where current openings could be increased. Crews also removed ladder fuels around the large, old trees in the area. After treatment the average stand basal area ranges between 50 and 70 sq. ft./acre and gaps between remaining tree crowns were expanded to 15 feet or greater.

Since one of the main goals of this treatment area was fire mitigation, all of the woody biomass generated from thinning was removed from the site. Larger diameter wood was hauled off the site. About half of the logs were used in creek restoration projects on other OSMP properties, and the remaining logs were taken to the OSMP firewood lot and given away to the public for

firewood. The slash from the project was chipped on site and then the chips were hauled to OSMP agriculture sites where they were used for livestock bedding and landscaping.

A before (left) and after (right) photo from the same location in the Lindsay Rd project area.

Spring Brook Thinning Project

The Spring Brook treatment area is less than a mile south of the Lindsay Rd unit and was part of the same 2016 Colorado State Forest Service grant as the Lindsay Road project. The work completed between July 26 and December 2, 2016 focused near the Spring Brook South Loop trail and covered a total of 38 acres. An additional 40-50 acres of thinning is planned for the Spring Brook area and will be a part of the 2017 OSMP forest management work plan.

Across the Lindsay area, basal areas range between 80 and 250 sq. ft. /acre and patches of 1000+ trees per acre are not uncommon. Mixed in with these high density areas are, on average, 5-10 large diameter (20”+) ponderosas per acre with ages approaching 200 years. These overgrown forest conditions with pre-settlement trees make the Lindsay and Spring Brook area an ideal site for thinning to decrease stand densities and restore a more historic forest structure. A large portion of the work done during the 2016 season was focused on some of the densest forest conditions in this area.

The average stand basal area prior to thinning in this unit was 145 sq. ft./acre but patches of the treatment unit had basal areas over 200 sq. ft./acre. The treatment in the Spring Brook unit was focused on removing 50-80% of trees in the 4” to 12” size classes and opening up the large, mature ponderosas. Residual trees in the smaller diameter classes were left in clumps of 5-20 trees to provide structure for Abert’s squirrel and elk habitat. Clumps were located away from mature trees to minimize competition and ladder fuels. The residual basal area in the treatment now averages approximately 73 sq. ft./acre with a more equal distribution across size classes (figure 4).

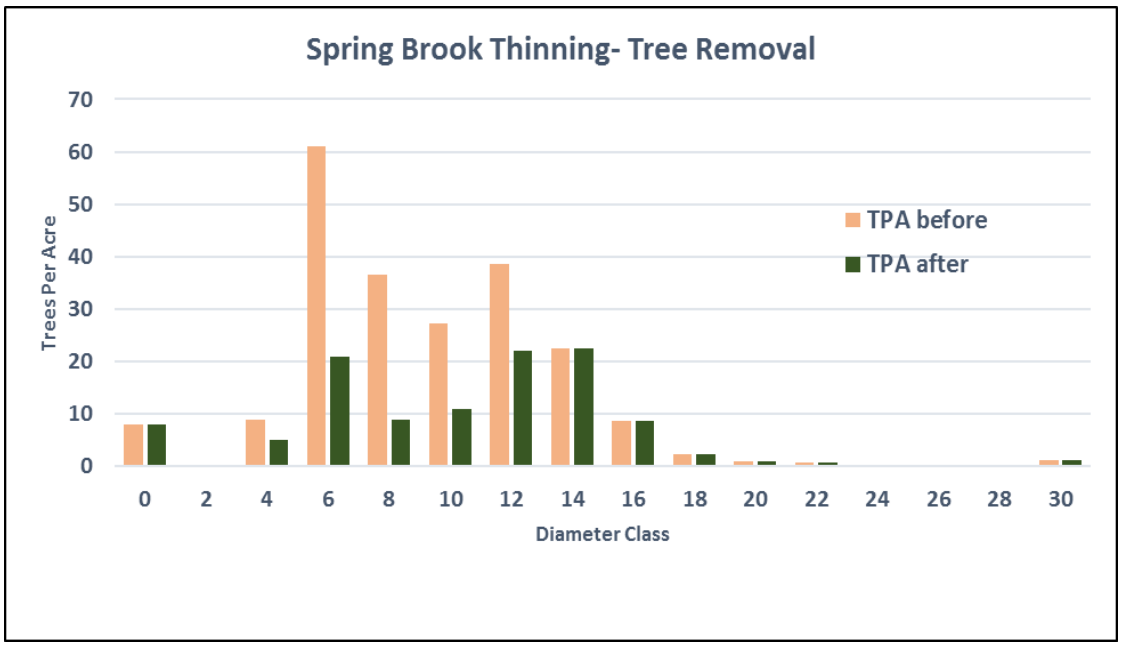


Figure 4- Tree distribution by size classes before and after thinning in the Spring Brook project area.

Betasso Thinning Project

In 2016 OSMP staff worked collaboratively on a larger scale project near the Betasso Water Treatment facility that was multiple years in the making and addressed a wide range of broad forestry goals. In 2011, City and County staff worked together to develop a scope of work that identified and addressed wildfire risks to important utilities infrastructure around the County. This scope included forest treatments designed to protect City of Boulder drinking water quality at the Betasso water treatment plant and the surrounding Betasso preserve. In 2013, the projects identified by City and County staff were awarded a FEMA pre-disaster mitigation grant and much of the work was completed between 2013 and 2016.

In 2016 OSMP staff worked with Boulder County Parks and Open Space, City of Boulder Utilities Division, and the City of Boulder Fire Department to implement the Betasso area portion of the work outlined in the grant. The County implemented a large scale thinning project on over 100 acres of the Betasso Preserve and City crews worked on a small defensible space project adjacent to the water treatment plant. OSMP provided forest management equipment, staff, and expertise to complete the work on City land and grant funds covered the cost of the work.

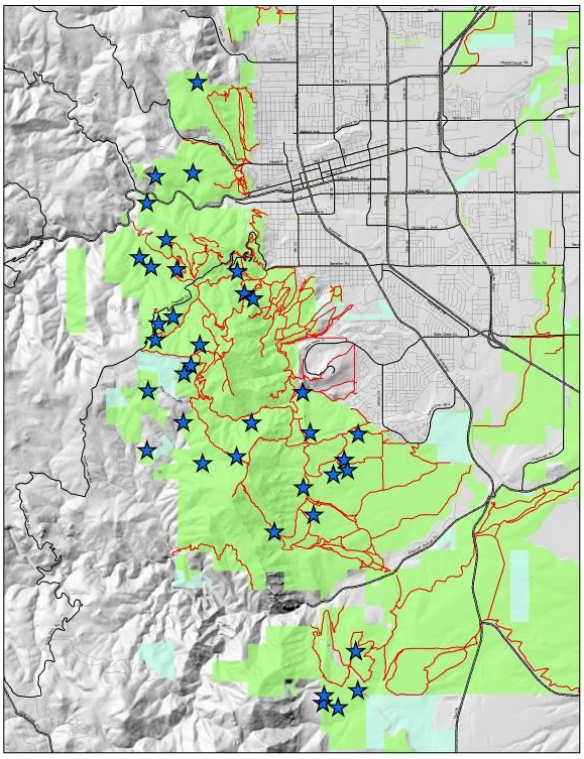
On City owned land, a total of 6.5 acres were thinned between September 19 and November 17, 2016 by staff from both OSMP and the City Fire Department's Wildland Division. Approximately 40-50% of the trees in the treatment area

were removed, focusing cutting on trees in the 4-12" diameter classes. Due to its close proximity to structures, the treatment prescription focused on fire mitigation with the objectives of removing ladder fuels, creating larger openings in the canopy, and creating 15-20' spacing between residual tree clumps.

2016 FOREST MONITORING PROJECTS

Understory Vegetation Monitoring

Forest understory monitoring has been a consistent part of OSMP's forest management. Tracking and quantifying the effects of thinning on the understory vegetation is an essential part of assessing the success of forestry projects. Over the past ten years, OSMP staff has established numerous monitoring sites in treatment areas across the system's low elevation ponderosa pine stands. The current goals of the understory monitoring are to determine the status and trends of understory vegetation, provide data to better understand the dynamic nature of forest systems, and provide a means of measuring progress towards performance goals. At each monitoring site, information on vegetation species and cover, tree density, canopy cover and litter depth is collected to get a complete picture of the sites vegetation characteristics.



Map 1: Understory monitoring sites sampled in 2016.

During the 2016 field season, a total of 37 understory monitoring sites were inventoried across all OSMP forest areas (Map 1). The sites were stratified by forest type to create a representative sample of all OSMP forests. Each sample site will be revisited in future years to account for variations in moisture, temperature and growing season length. All of the sampling in 2016 was completed by OSMP staff between June 25 and September 2. A total of 17 days were spent by one to three staff members on this monitoring project in 2016.

Initial analysis of the understory data shows positive understory responses to ongoing forest management. Treated areas show a significant increase in both native species richness and overall native species cover. These results show that opening the forest canopy and increasing light and resources to the understory vegetation is meeting one of the key goals of the FEMP, to maintain and enhance native species communities. On the flip side, treated areas are also experiencing an increase in non-native vegetation cover. Managing non-native establishment following forest treatments will continue to be a management focus for staff. In 2017 forest staff and IPM staff will work together to implement new weed mapping techniques and increase weed management efforts in the forest.

Overstory and Photo Point Monitoring

Monitoring of forest stand structure and composition is done with permanent photo points and overstory inventories. Photo points have proven to be an effective way to show differences prior to and following treatment. While they are less quantitative than other forms of monitoring, photos can be useful in displaying changes in tree density, understory density, and non-native species composition. Across the treatment areas in 2016, 31 permanent photo points were established. Each point was located using GPS, marked with a tree tag, and the direction of the photo was recorded. Photos for the 2016 projects are attached to this document as Appendix A.

OSMP has 337 forest stands mapped across the system where quantitative data is collected through overstory inventories. This data is an essential part of OSMP's forest management and provides detailed information about forest structure and overall forest health. Forest overstory data provides the baseline information for all forest prescriptions. In the past three years, staff has increased efforts to re-sample large portions of the system and update inventories that are over ten years old. In 2016 a total of 63 stands and 386 plots were sampled in the areas of Bison Dr., the west side of Bear and South Boulder Peaks, Flagstaff, Flatirons Vista, and Lost Gulch.

2017 WORKPLAN

In 2017, OSMP's forest management will continue at a similar pace to previous years. In addition to thinning efforts, staff will continue to conduct understory monitoring, continue overstory inventory efforts, expand vegetation mapping across all OSMP forested areas, and continue collaborative efforts with other local forest and fire managers.

Forest management projects in 2017 will focus on completing projects that were started in 2016 as well as beginning projects in areas of the system that haven't been treated for many years. Priorities will include the completion of the Spring Brook thinning project and the Watertank prescribed burn. Burning is always weather dependent, but the goal will be to complete Watertank early in the season. Additional thinning work is planned for the Lindsay area west of the Denver Water Board Road, the south portion of Flatirons Vista, and the area near the Fern-Mesa Trail junction. Staff will also be working on collaborative projects with Rocky Mountain Fire and defensible space improvements at the Flagstaff Summit Nature Center.

Monitoring efforts to track treatment effectiveness and overall forest health will continue during the 2017 season. The 37 understory monitoring sites will be resampled in July and August. Staff will also continue efforts to resample overstory inventory sites and fuel loads in prescribed burn areas. In addition to the forest specific monitoring, staff will continue to revisit OSMP vegetation mapping efforts. Portions of the mapping are over ten years old and staff will map large portions of forested areas to the association level.

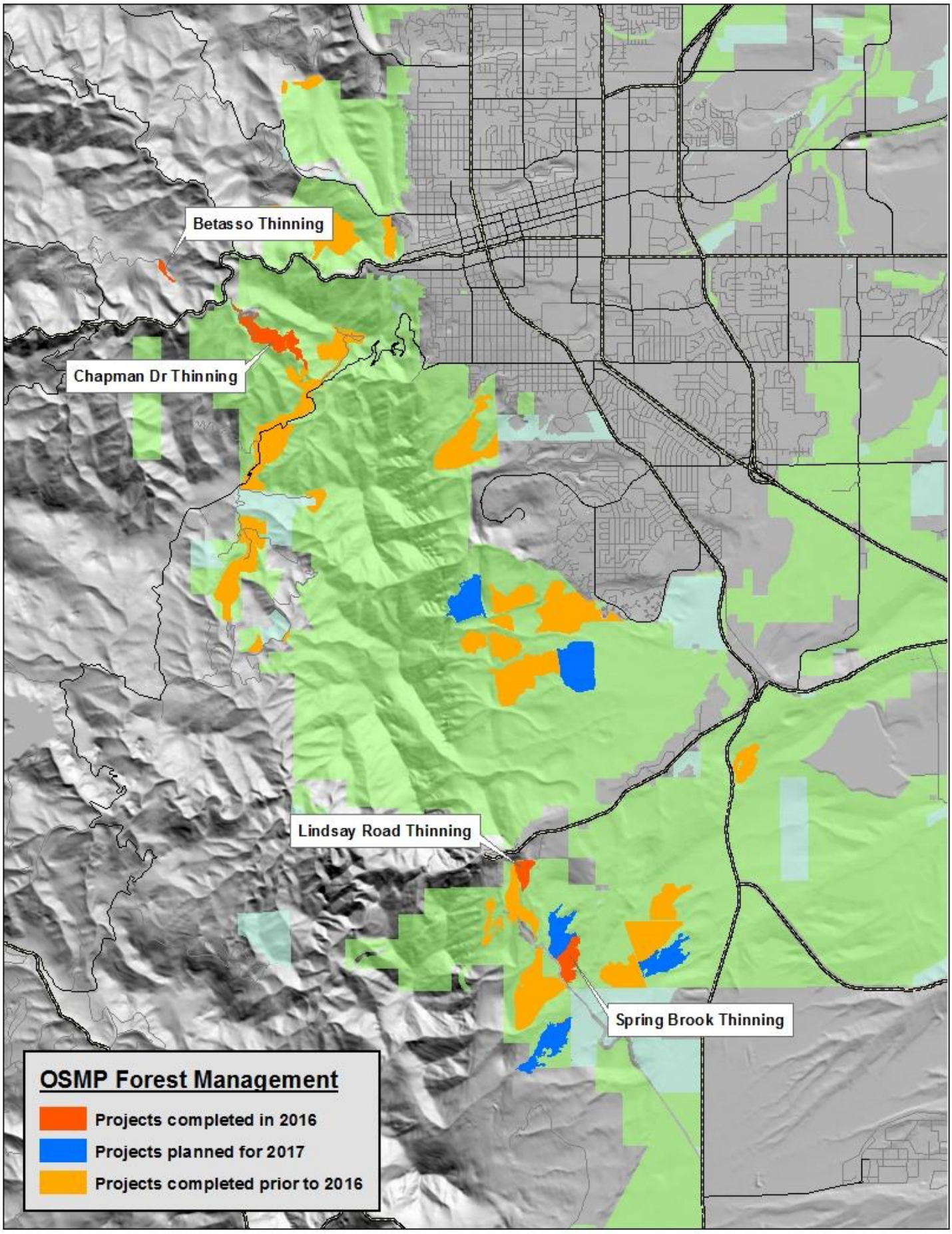
RELATED DOCUMENTS

Anchor Point. (2007). *City of Boulder, Wildland Urban Interface, Community Wildfire Protection Plan*. Report prepared for City of Boulder, Fire Department. Boulder, Colorado.

Available at: http://static.colostate.edu/client-files/csfs/documents/city_of_boulder_cwpp_main_report_final.pdf

City of Boulder. (1999). City of Boulder Forest Ecosystem Management Plan, Part 1, June 1999. City of Boulder Open Space Department, City of Boulder Mountain Parks Division, and City of Boulder Wildland Fire Division, Boulder Fire Department.

Available at: https://bouldercolorado.gov/osmp/forest-ecosystem-management-plan


Betasso Thinning
Chapman Dr Thinning
Lindsay Road Thinning
Spring Brook Thinning
OSMP Forest Management
Projects completed in 2016
Projects planned for 2017
Projects completed prior to 2016

Appendix A: Photo Point Monitoring

Chapman Dr

Chapman 1: April 30, 2015

August 31, 2015

Chapman 2: April 30, 2015

August 31, 2015

Lindsay Rd (CR67)

Lindsay Rd 1: April 12, 2016

August 30, 2016

Lindsay Rd 3: April 12, 2016

August 30, 2016

Spring Brook

Spring Brook 7: May 25, 2016

August 30, 2016

Spring Brook 5: May 25, 2016

August 30, 2016

Spring Brook 8-2: May 25, 2016

August 30, 2016

Spring Brook 8-3: May 25, 2016

August 30, 2016